PIKES PEAK RADIO AMATEUR ASSOC



Ø BEAT

SPECIAL SERVICE CLUB

JULY 1989

COLORADO SPRINGS, COLORADO

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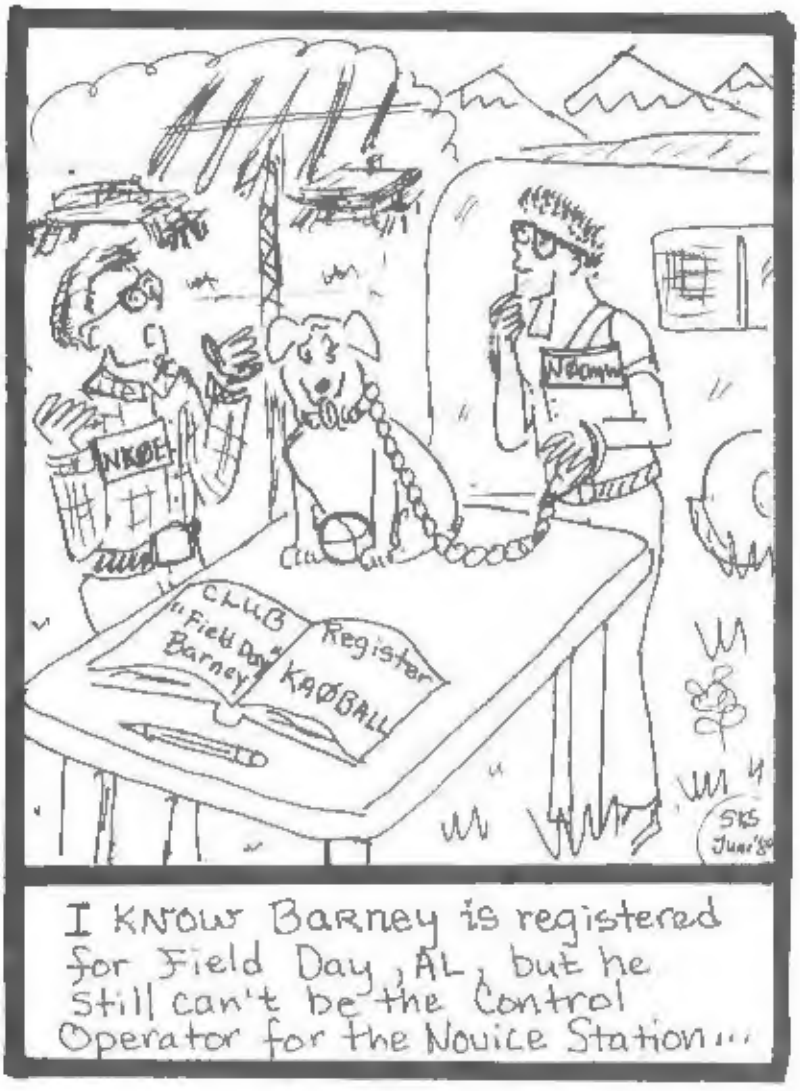
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* denotes the first year of a two-year term.

ZERO BEAT is published monthly in the interest of the members of the Pikes Peak Radio Amateur Association, Inc., P.O. Box 16521, Colorado Springs, Colorado 80935. Cost is 50¢ per month for non-members or a $4.00 per year subscription. Permission is given to reprint articles or excerpts provided credit is given. Deadline for submission of articles is the 21st of the month. Classifieds accepted anytime.

The Pikes Peak Radio Amateur Association meets on the second Wednesday of each month at the Hewlett-Packard facility, at the intersection of Lexington and Union, at 7:30 p.m. All amateurs and interested parties are invited to attend.

Editor: Keith Goobie NYØT, 5335 Coneflower Ln., Colorado Springs, CO 80917 637-1525



I KNOW Barney is registered for Field Day, AL, but he still can't be the Control Operator for the Novice Station...

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MONTHLY CLUB MEETING

The next regularly scheduled meeting of the Pikes Peak Radio Amateur Association will be held at the Hewlett Packard facility at the intersection of Union and Lexington Boulevards. Detailed directions may be obtained from any Board member. Please note that the meeting time is at 7:00 pm (1900 hrs). This month's meeting will be on 12 July 1989.

This month the program is tentatively scheduled to be on Spread Spectrum Communications.

From the N3Aia Packet BBS
Introduction to Packet Radio Parts 1 -3 of 22

What is to follow, is a VERY GOOD article entitled "Packet Radio: An Introduction" written by Larry Kenny, WB9LOZ. It was originally produced in 16 separate segments, however, when it was transmitted via packet, it was more efficient to break the larger files up so no one file exceeded 5 or 6K. As a result, there are now 22 parts rather then the 16 the author refers to and for this reason, some of his references to other parts within the text may be slightly off.

For those interested, it is HIGHLY RECOMMENDED that you run these off into hard copy, as he goes into some detail and overall I found the article to be quite useful to both the novice and experienced packet radio operator.I will try to run a couple of parts per day, so as not to clog up the network too badly and at the same time distribute his article in a timely manner.Hope some find it useful - I did!

Doug, N3AIA

PACKET RADIO: An Introduction

-- by Larry Kenney, WB9LOZ

Packet Radio is the latest major development to hit the world of Amateur Radio. If you haven't already been caught by the "packet bug", you're probably wondering what it's all about and why so many people are so excited about it. Well, continue reading, because you're about to find out.

Packet seems to offer something different from other facets of Amateur Radio, yet it can be used for everything from a local QSO to a DX contact 2500 miles away (on 2 meters!), for electronic mail, message transmission, emergency communications, or just plain tinkering in the world of digital communications. It presents a new challenge for those tired of the QRM on the low bands, a new mode for those already on FM, and a better, faster means of message handling for those on RTTY. Packet is for the rag chewer, the traffic handler, the experimenter, and the casual operator.

A ham can get involved very easily with relatively small out-of- pocket expenses. All you need is a 2-meter transceiver, a computer or terminal, and a TNC. You probably already have the two meter rig and a computer of some kind, so all you need to buy is the TNC, which costs just over $100. The TNC is the Terminal Node Controller, the little black box that's wired between the computer and the radio. It acts very much like a modem when connecting a computer to the phone lines. It converts the data from the computer into AFSK tones for transmission and changes the tones received by the radio into data for the computer. It's a simple matter of wiring up a plug and a couple jacks to become fully operational.

Packet is communications between people either direct or indirect. You can work keyboard to keyboard or use electronic mailboxes or bulletin board systems to leave messages. Due to the error checking by the TNC, all of it is error free, too. (That is, as error free as the person at the keyboard types it.) As the data is received it's continuously checked for errors, and it isn't accepted unless it's correct. You don't miss the information if it has errors, however, because the information is resent again. I'll go into how this is accomplished in a later part of this series.The data that is to be transmitted is collected in the TNC and sent as bursts, or packets, of information; hence the name. Each packet has the callsign or address of who it's going to, who it's coming from and the route between the two stations included, along with the data and error checking. Since up to 256 characters can be included in each packet, more than three lines of text can be sent in a matter of a couple seconds. There is plenty of time between packets for many stations to be using the same frequency at the same time, and all using the same repeater. The repeaters, known as digipeaters, are simplex operations and occupy a single frequency, as opposed to the common two-frequency repeaters used for voice communications. You can link from digipeater to digipeater, too, extending your range tremendously. I've worked twelve states on 2-meters with packet, all with a ten watt rig, thanks to this linking capability.

If all of this sounds confusing, don't let it bother you, because that little black box, the TNC, does everything for you automatically. Packet might seem very confusing at first, but in a day or two you're in there with the best of them. In future parts of this series, I'll be telling you more about packet--how you get on the air, how to use it to your best advantage, and ways to improve your operation. We'll even talk about that little black box, the TNC, and tell you about all its inner-most secrets.

(Thanks to K4CEF and Westlink Report for providing "POINTS TO PONDER ABOUT PACKET - FOR THE NON-PACKETEER" in their November 14, 1986 issue. I've used information from that article in this column.)

PACKET RADIO: An Introduction - PART II

- by Larry Kenney, WB9LOZ

In the first part of this series we told you, in general terms what packet radio was all about,..what it is, its uses, the equipment used and, generally, how its transmitted. Now we're going to tell you how to get on the air, make a QSO, and become familiar with your packet station. Whether you're new to packet, having

just received a new TNC, have been involved for just a short time, or are one of the "old timers" with three or four years of experience, this series should help all of you. Even if you don't yet own a TNC, you should keep this article handy for future use. I'll bet you'll be joining us soon!

The equipment needed to get on the air is a VHF transciver, a computer or terminal, and a TNC - the terminal node controller - the little black box we talked about in part 1. (There is packet activity on HF, but VHF is where all the action is. It's the best place to start out in packet.) The TNC contains a modem and is equivalent to the modem used to connect your computer to the phone lines, except that it also contains special software that's specially designed for ham radio packet use.

When you buy a TNC and take it out of the box, you'll find cables supplied for connecting it to the radio, but you'll have to attach the appropriate mic and speaker jack connectors for the radio you're going to use. You also have to furnish the cable that connects the TNC to your computer or terminal. In most cases, the standard RS-232 port is used between the TNC and computer, however this varies on the type of computer and TNC used. The operating manuals supplied with the TNC have a good write up on the various computers and the cabling needed. I would advise that you read the introduction and set up procedures for your particular TNC very carefully. Most companies have supplied excellent manuals, and you usually can figure out all of your set up problems from the the information supplied in the manual.

Once you have everything wired and connected together, turn on the computer, load a terminal program (anything used for a phone modem will work well for packet) and get into receive mode. Now turn on the radio and make sure the volume is turned up about a quarter turn (about the "10 o'clock" position) and make sure the squelch is set. It should be at the point where the background noise disappers, just as it would be set for a voice QSO. Next, turn on the TNC. You should get a "greeting" or sign on message showing the manufacturer's name, software version, etc. If you see a bunch of gibberish, such as &ffSd.*ssan>m, it means that the data rate of the TNC and computer are not the same. This data rate is better known as the baud rate. The baud rate of the TNC has to match the baud rate used by your computer terminal program and is easily adjusted. Check you TNC manual for this procedure, as it varies from TNC to TNC. If you don't see a "greeting" or the gibberish, check your cables and connections. Make sure that you have everything connected properly, that the right wires are on the right pins, etc.

(Continued on pg. 8)

DITS AND BITS

O-Beat will allow amateurs to place free non-commercial ads and announcements of interest to local amateurs on a space available basis. O-Beat will try to insure accuracy in printing but cannot guarantee it.

PAYMENT DUE!

If you ordered a PPRAA coffee mug and haven't paid yet, please bring the money to the next club meeting. If you *didn't* order a mug yet it's not too late. Contact Karen Garbee at 495-0091 to order one, they're only $10. They include your name, callsign and the club logo.

FOR SALE:

One RF Concepts 2-meter amplifier. 10 Watts in gets you 170 Watts out. Asking $200. Contact Al Vrooman at 473-1660.

FOR SALE:

A 12 kilowatt propane gas generator. Sale will be by sealed bids received not later than 15 August 1989. Minimum allowable bid is $500.00. Mail bids to the Pikes Peak Radio Amateur Association, P. O. Box 16521, Colorado Springs, CO 80935.



The View From The Peak

By George Hinds, N8C1X

In the June issue, I mentioned discovering a linked repeater system of far more than the usual scope while on a recent journey to the Pacific Northwest - it's international in coverage, and there are 26 repeaters involved!

This system in Washington, Oregon and British Columbia is called the "Evergreen Intertie" and includes, in British Columbia, the "Interprovincial Amateur Radio Network" of 12 repeaters; in the States it includes 14 repeaters.

The repeaters operate in the 2M, 220 and 440 bands. Access is open to all licensed amateurs; each repeater group within the network determines the procedure for making access codes available to the amateur user.

This 26-repeater system is a mix of interconnection techniques and equipment. For example, in Canada half-duplex interconnection is maintained on 220 and 440. With four independent UHF trunks established in B.C., 12 repeaters can be interconnected. All 14 Washington and Oregon repeaters can connect to one of three full duplex trunk link systems, or one half-duplex trunk. All in all, there are eight trunks, seven intertie switches, twenty six repeaters, and seventeen "drop" switches comprising the system. Generally, all switches are "normally" on or off by agreement and are to be left in the "normal" position after a user finishes.

Users can interrogate several of the sites to learn what position the interconnect switches are in; when questioned, sites can reply with call sign and switch positions. Control operators can lock switches to prevent changes. Diagrams of the intertie system are furnished to users so that it's easy to operate and control the linking. Variations in "courtesy tones" tell users and listeners what position link switches are in at the time. Some of the repeaters in the intertie system have voice detector circuits; they won't respond to carriers unless a voice ID precedes the tones. Autopatch access is only available to users who demonstrate proficiency in operating the system and maintain membership in a repeater group within the system.

The K7NWS Seattle 145.33 repeater has a mailbox and can store messages; it can be accessed from anywhere on the Intertie. Mail left in the box and not called for is automatically erased at midnight of the day following.

Here is a recap of the repeaters and locations in the complete system:

Washington -
Seattle: 444.65; 145.33; 224.34.
Enumclaw (Mt. Baldi) 443.175.
Naneum 147.26.
Spokane 147.20; 223.90.
Pullman 146.74.
Walla Walla 147.28.
Olympia 145.47.
Longview 147.26.
Kalama 224.44; 442.825.

Oregon -
Salem 147.02.

British Columbia on Vancouver Island:
Port McNeil 146.94;
Newcastle Ridge 146.68;
Campbell River 146.96;
Port Albernie 147.24;
Ucuelet 145.33;
Nanaimo 145.47;]
Victoria 146.68 (to U.S.A. trunk).

British Columbia on mainland:
Vancouver 147.06;
Chilliwack 145.31;
Fraser Canyon 147.06;
Lytton 147.06;
Clinton 146.66.

Remember The MARC Swapfest / Campout In the pines at Red Rocks Campground, 4 miles north of Woodland Park business district on Highway 67, Saturday and Sunday, July 22-23. There'll be a potluck dinner Saturday night; bring you own meat plus a pot luck dish and join in. Over $1500 in door prizes; drawing 3 p.m. Sunday - an Icom IC-725; an Icom IC-32AT, and a Yaesu YS-500. To camp or to sell, spaces are $7.50 per night (no double charge); bring your own table or tailgate. For info, contact Joe Tafoya, N0CMD, on 145.16 or 687-3641.

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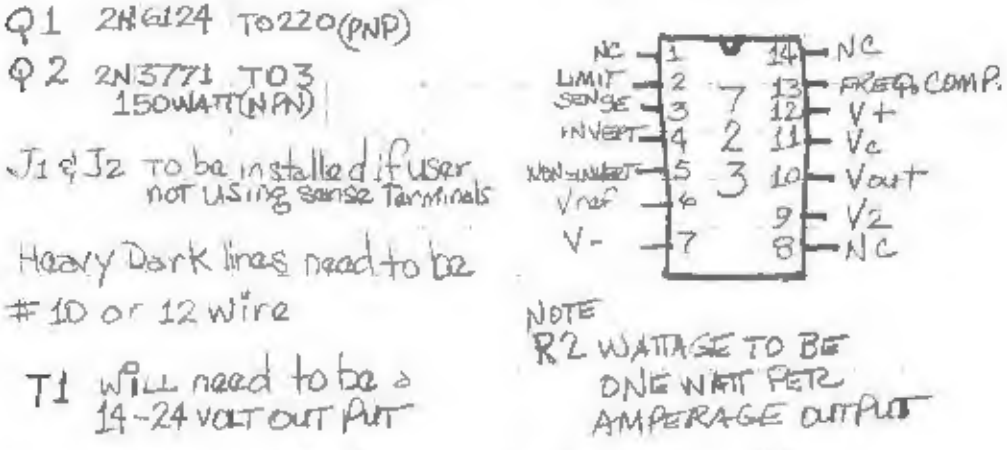
BUTTERNUT	WELLER	ARRL BOOKS
HUSTLER	FLUKE	SAMS BOOKS
CUSHCRAFT	BELDEN	TRIPP LITE (power supplies)
LARSEN	AMPHENOL	VAN GORDEN
ANTENNA SPEC.	MFJ	BENCHER
UNIDEN	B & W	

POWER SUPPLIES by KDØSD

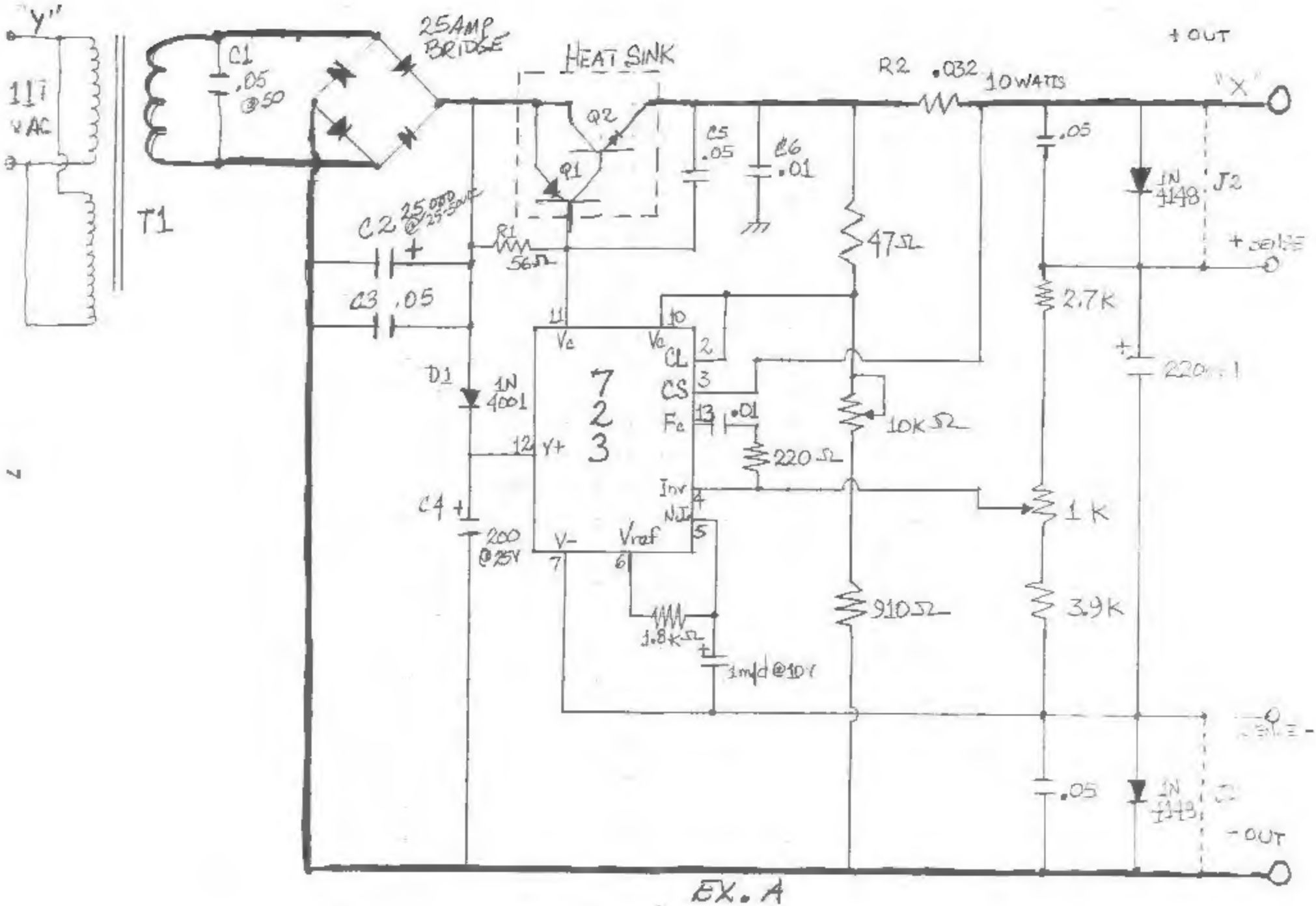
For some time know, you have seen a change, in the things I write about. In the last issue I gave you a schematic for an in-expensive power supply. In this issue, is something, a little more complicated.

Probably, one of the most used sytems of regulation for power supplies is an IC chip called a 723. This single device, can perform like nothing else. In this months issue, I have used just such a device. Of course I have also, allowed you the option of making this supply, a lot stronger. That is, more amperage for that mobil rig or what ever. See Ex.A & B

The neat feature of this supply is, that it has sense lines. This will allow the user to have the supply in a remote location, and yet maintain a terminal voltage of 13.6, providing you have sufficient wire size to carry the load over a long distance. Of course if the distance is short, well then you simply jumper the sense lines out, and away you go. There are some other features one could add to the system, for even more protection, Like an MOV, accross the secondary say at 25 to 30 volts, with a fuse between it and the bridge rectifier. With that added, there would be no way for anything to go wrong. You would have protection, for both the supply system and the rig. Not bad huh? There are a lot of used parts out there and of course Radio Shack, to fill the requirements needed for this supply. See ya next month, with yet another supply idea. 73's from KDØSD, PAUL..



EX. B


"Y"
117 VAC
T1
C1 .05 @50
25AMP BRIDGE
HEAT SINK
Q2
Q1
C5 .05
C6 .01
R2 .032 10 WATTS
+ OUT
"X"
C2 25 MFD @ 25 VOLT
R1 56Ω
C3 .05
D1 1N 4001
7 2 3
Vc
Vo
CL
CS
Fc
V+
Inv
NJL
V-
Vref
.01
220Ω
10KΩ
47Ω
910Ω
1.8KΩ
1 mfd @ 10 V
C4 + 200 @ 25V
2.7K
1K
3.9K
220 mfd
.05
1N 1148
J2
+ SENSE
- SENSE
- OUT
EX. A

Now we need to explain the three levels of communicating you can do from the keyboard. First, you can communicate with your computer for setting up the terminal program; second, you can communicate with the TNC; and third, you can communicate with the radio. It's very important that you know which level you're in when working packet. I can't help you much with the computer level, since that varies with manufacturer, model and type, but once you get the terminal program ready to receive data, you're ready to talk to the TNC.

First, do a "control C" (press the CNTL and the letter C simultaneously); this puts the TNC in COMMAND mode, the level where you communicate directly with the TNC from the keyboard. You should see "cmd:" on your screen. Enter "MYCALL - - - -" with your callsign in place of the dashed lines, such as "MYCALL WB9LOZ", followed by a carriage return (CR). All commands are followed by a (CR). This sets into the TNC memory the call that you're going to use on the air. If you type "MYCALL" (CR) now, it should respond with your call. If it does, you've proven that the computer to TNC linkup is working fine. If you do not see anything on the screen when you type, blindly enter the following: ECHO ON (CR). If you see two of everything that you type, such as MMYYCCAALLLL, enter ECHO OFF (CR).

Introduction to Packet Radio 3 of 22

by Larry Kenny, WB9LOZ

You're now ready to go on the air! Tune the receiver to any odd numbered frequency between 144.91 and 145.09 that has some activity on it and set the rig up for simplex operation. Enter "MONITOR ON" (CR), then watch the screen. You should soon be seeing the packets that are being sent over the air by other stations. If you don't see anything in a minute or two, try tuning to another frequency.

Watch for callsigns with a * next to it, such as W6PW-1*, WA6RDH-1*, or WB6SDS-2*. Callsigns with an asterick indicate that you're copying the packet from that station, as it's being repeated, or digipeated. Jot down the call.In packet, you can have up to 16 different stations on the air at the same time using the same callsign. That's where the numbers come into play. The calls W6PW, W6PW-1, W6PW-2, W6PW-3, W6PW-4 and W6PW-5 are all individual stations operating under the same station license. The numbers are used to differentiate between the various stations.

Now, before you try to make your first QSO with someone else, you should check out your equipment to make sure it's set up properly. To do that, you can CONNECT to yourself. Note one of the callsigns you jotted down a minute ago. Make sure your radio is still tuned to the frequency where you heard that call, then enter the following: "C - - - - V - - - -" (CR) where the first dashed lines are YOUR callsign and the second dashed lines are the call of the station you jotted down. The C means CONNECT and the V means VIA. "C WB9LOZ V W6PW-1" means connect to WB9LOZ via W6PW-1. You should soon see "*** CONNECTED TO (your call)" on the screen.

You have now entered the third level of communications, called CONVERSE mode, and this is where you communicate from the keyboard to the radio. Anything you type on the keyboard will be transmitted over the air as a packet every time you hit a (CR). If you enter "Test" (CR) you should see "Test" a second time on the screen, as it's transmitted, then digi- peated and sent back to you. In this case you'll only be talking to yourself via another station, but it's a good way to check to make sure your system is working properly. If that works, hit a CONTROL C. This puts you back into COMMAND mode where you talk to the TNC again. Enter "D" (CR). This will disconnect you from the other station, and you'll see "DISCONNECTED" on the screen.Now you're ready to talk to someone else! Watch for a familiar call on the screen while monitoring or note calls you see frequently. Be sure to note whether or not a digipeater is being used by watching for the *. If you see WB9LOZ > WA6DDM, W6PW-1*, for example, you're receiving the packets from W6PW-1. If you do not see an asterick, you are copying the station direct. When the station you want to contact is finished with his QSO, enter "C - - - -" or "C - - - - V - - - -" (depending on whether or not a digipeater is needed) followed by (CR). You should get a "*** CONNECTED TO ..." on the screen, which means you're in converse mode, and your first QSO with someone else is underway! Anything you type now will be sent to the other station, and anything he types will be sent to you. When you're finished, be sure to do a CONTROL C to get back into command mode, then enter "D" to disconnect from the other station.You're on the way now to lots of packet fun and adventure!

- WB9LOZ

TELLER COUNTY HILL CLIMB

The Teller County Hill Climb was held June 10 - 11 this year. The following amateurs provided communications support to the Colorado Hill Climb Association:

KE0WC	Don
WA0TAN	Jim
W9MIL	Mike
WB7THT	Rick
KA0WIE	Fred
K0TER	Mike
W0MCT	Doc

The communications were excellent and we would like to thank all involved. October 7 - 8 is the date for the Fall race a we will again need volunteers.

73 Doc W0MCT

MINUTES OF THE JUNE BOARD MEETING

submitted by Al N0CMW

The Board meeting was held on 19 June 89 at the QTH of Bdale N3EUA and Karen N1FED.. In attendance were Al N0CMW, Bud N0DDF, Doug N0HJT, Rick WB7THT, Ron NK0P, Chris NX0E, Karen N1FED and Bdale N3EUA.

It was decided that when Rick WB7THT assumes the presidency after Keith leaves, then Doug N0HJT will take over as vice president until the October elections.

A discussion on the need for a portable repeater for public service events lead to the decision to authorize Bdale to negotiate with the FM Association to see if they will split the costs with us. The repeater will be used by both groups for public service only, and the repeater will not be on the air at other times.

It was decided that the 12 KW generator the club has is too much for club needs, so it will be auctioned off. The minimum bid will be $500.00. Sealed bids will be accepted until mid-August *[Ed. note: mail bids to the club address.]* The proceeds will be used to help purchase a portable 3500 watt generator, more suitable for typical uses.

Karen N1FED was authorized to spend up to $75 to get a club logo printed on the back of the t-shirts to be given to those working the Colorado State Games.

A Chairperson is still needed for the education committee. Keith NY0T may apply some last minute pressure prior to his crossing the border.

The tentative program for July is Spread Spectrum, August is EMP by Gen. Royer, and September is still open. October is elections, but a short program is still needed.

Rick WB7THT will look into new possible club meeting sites, should the HP facility become unavailable.

The meeting adjourned at 2030.

-N0CMW

AFA RADIO CLUB MINUTES

The AFA Radio Club meeting was held at 1130 hrs at the community center lunch area. Present were Floyd KB5FCN, Bud N0DDF and Al N0CMW. All others were TDY or on business, so no business was conducted. The next meeting will be July 11 at 1130 at the same place.

-N0CMW

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MINUTES OF JUNE GENERAL MEETING

submitted by Al NOCMW, Secretary

The general meeting of the Pikes Peak Radio Amateur Association was held at the Hewlett-Packard Briargate Facility, Wednesday evening 14 June 1989. The meeting was called to order by the president Keith NY0T at 19:00, and followed by the introduction of members and guests.

The minutes of the previous General Meeting and Board meeting were approved as printed in 0-Beat.

Committee Reports

Note: Anyone wishing to help out on any of these committees, please contact the chairman at the phone number listed. Thank you for your support.

Treasurer - Ron NK0P (593-8352):
The treasurer's report was given by Al, N0CMW, since Ron was away on business. The club checkbook balance as of June 1st was $2,463.37. The 1989 swapfest financial statement is :

	INCOME	EXPENSES
TICKET SALES	1,611.00	
ICOM 735		702.26
FLYERS		36.52
TICKETS		101.18
*TABLE SALES	705.00	
TABLE RENTAL		410.03
RAFFLE LICENCE		62.50
HOURLY PRIZES		99.75
TOTAL INCOME	$2312.00	
TOTAL EXPENSES		$1412.24
NET PROFIT	$903.76	

AS OF JUNE 01,1989
(* DUE IN $96.00

Interference - Ron NK0P (593-8352):
Nothing to report.

Education - :
NOTE: We will need an education chairman if we are to keep our status as a Special Service Club.

Publicity - Karen N1FED (495-0091):
Custom coffee mugs for the PPRAA 1989 Field Day effort are available for $10 each. They are expected in by Field Day.

Colorado Council of Amateur Radio Clubs (CCARC) Oak K0ROL (635-2289):
Nothing to report.

Deaf and Blind School - Jim WA9ABB (598-7543):
Jim was away on business. Since he is leaving, a new chairman is needed. *[Ed Note: A couple has volunteered to take over for Jim when the D&B school re-opens in August.]*

0-Beat - Chris NX0E (495-0624):
Due to the Independence Day holiday, articles are needed by Field Day weekend.

ARES - Cliff KB0CVW (597-7334):
Meets every Wednesday night on the 37/97 repeater (W0YNE) at 1830 hrs local.

Public Service - Mike K0TER (636-1290):
We are popular this year! The Volks March came off ok, thanks to WA0DUM and all the others that helped. W0MCT provided a nice net control station (a new mobile home). We will need more help with the rocket launch on August 4, 5, and 6. Other events for which help is needed are a motor cycle endura for field day weekend and a bike-athon July 8 - 9. Contact Mike if you are able to assist. This year the club chose not to participate in the Pikes Peak Hill Climb as a group due to conflicts.

VE Testing - Max KD0EL (488-9289):
Next test will be this September at Chapman College, at the corner or Flintridge and Academy. Max expressed the importance of pre-registering. This test may be closed to walk-ins, so register with Max if you want to be sure of a place at the exam.

Field Day - Max KD0EL (488-9289)
June 17 will be a day to service the field day equipment at Max's place. A picnic will be held on Saturday of Field Day weekend. The CW station is being set up by Mike K0TER, the phone station by Les KC0NC, the novice/tech station by Chris NX0E, and the packet station by Jeff N0JLH. Jody KA0ROZ will be in charge of the picnic and Sunday breakfast. Al N0CMW will probably not be available to set up the VHF station this year.

Old Business

Nothing to report.

New Business

Bill Puxty, 633-2362, needs help with setting up a station and an Elmer to help him with the Novice license. Doc W0MCT reported that the Teller County Hill Climb weather was not the best but 7 people participated anyway. *[Ed note: See Doc's article elsewhere in this issue.]* Mike K0TER was presented with a certificate from the club for his public service work. Jim WA9ABB wasn't present but was awarded a certificate for his work with the D&B school. Tom Merideth gave a brief talk on the upcoming Colorado Games this July 28 - 30. The club voted to assist with communications for the event; contact Mike K0TER if you can help. Malcolm KE9S took over from Mike K0TER the chair of the picnic committee, since Mike is very busy with all the public service events. This year the picnic is an all-Colorado Springs-Ham gathering to be held at the Air Force Academy courtesy of the AFA Radio Club. It will be held August 6 at picnic area 3 (same as our Field Day site). Bud WB0TIB of the PPFM Association is working with Malcolm on the picnic. Bdale N3EUA reports he has the complete (U.S.) call book on his unix computer system at 495-2061.

Prizes:
After a short intermission, the drawings were conducted by Rick WB7THT, the following won prizes:

KD0EL	Repeater Directory
W8JTD	Callbook
WB4NWC	Blitz Buster
KD0DPH	Roll of Wire
N0KIA	Spray Can

Program:
The program this month was an interesting presentaion on orbital mechanics, given by Mike Weiderhold. He answered many questions during and after his presentation. The club presented him with a certificate for his talk.

The meeting was adjourned at 2130. The next meeting will be on July 12 at 1900 hrs at the HP Briargate Facility.

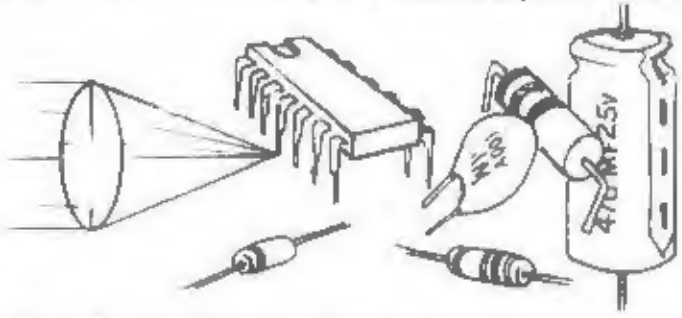
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Closed Saturday 1 PM, Sunday & **Monday**

Closed for out-of-state Hamfests, July 7-24.

Hamfest Schedule:

7/8, 9	Cheyenne, WY
7/15, 16	East Glacier, MT
7/16	DRC — Jeffco Fairgrounds, Denver *We can't be there!!*
7/22, 23	Woodland Park, CO
7/30	RMRL — Jeffco Fairgrounds, Denver — *postponed until later in Fall!*
8/12, 13	Amarillo, TX
9/2, 3	Alamagordo, NM
9/10	Camp-Out Laramie, WY
9/15, 16	Wichita Falls, TX
9/24	Boulder County Fairgrounds — Longmont *We plan to be there!*
9/30	Santa Fe, NM
10/8	Lubbock, TX
11/10, 11, 12	Odessa, TX
12/2, 3	Apache Junction, AZ *We may not get there!*

Hamfest season is in full swing and the equipment inventory changes weekly.
We have lots of good used HF and VHF gear in stock.
Call for the rig you want.
73's — Jess

6/89

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Additional Names _____ Call _____ Class _____

_____ _____ _____

_____ _____ _____

Associate Member $8.00 ☐ (Outside Teller & El Paso Counties.)

PPRAA is not associated with the Pikes Peak FM Association.